

# Qwest Foundation for Education

## Competitive Sub-grant Application Assurance Sheet

Project Title: Mobile Computer Lab for Science Amount of Request: \$9,988.95

District Name: Salmon School Dist. 291 Number: 291

Name of Certificated Teacher (or "lead teacher" if more than one): Renae Lewis


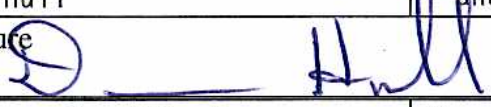

Name of School currently teaching at: Salmon High School

Years taught in Idaho K-12 public education: 13

Content area(s) that you are teaching in Idaho K-12 public education: 9-12 science

I certify that if I receive a Qwest Foundation for Education Grant –

- I agree to create a video highlighting my project for the purposes of sharing best practices with other Idaho K-12 teachers.
- I agree to do one presentation on my project to other Idaho K-12 teachers before October 31, 2009.
- I agree to submit an electronic report to the Idaho State Department of Education before October 31, 2009.

<b>Superintendent Name (print)</b> Tana Kellogg	<b>E-mail</b> tkellogg@salmon.k12.id.us	<b>Telephone</b> 208 756-4271
<b>Signature</b> 		
<b>Principal Name (print)</b> Dan Hull	<b>E-mail</b> dhull@salmon.k12.id.us	<b>Telephone</b> 208 756-2415
<b>Signature</b> 		
<b>Teacher or Lead Teacher (print)</b> Renae Lewis	<b>E-mail</b> rlewis@salmon.k12.id.us	<b>Telephone</b> 208 756-2415
<b>Signature</b> 		

## Project Abstract

The science department at Salmon High School is requesting a Qwest Foundation grant to purchase a mobile computer classroom for use in laboratory experiments and activities. The grant money would be used to purchase ten new iMac notebooks, a Canon PIXMA i100 portable color printer and iLife software. These computers would be used to increase our student's accessibility to science-related technology. Currently our school has a very low number of functioning computers and these are used almost exclusively for internet access and word-processing projects.

With the addition of computers to the science program, students will be introduced to many new science-related applications. Some examples of these include measuring the structural integrity of bridges, calculating kinetic and potential energy of roller coasters, creating pedigrees and digitally journaling the effects of growth hormones on plants. These computers would not only speed up data collection, but make it more accurate by utilizing software that the school is already licensed to use. We currently have software that accompanied our Smart Timers and science probe kits. When used in tandem with computers, these lab tools will record all changes in the experiment and put them in both table and graph form. We also have software that accompanied the text books for physical science and environmental issues that the district purchased last year. Computers in the classroom would allow us to take advantage of this software. Last spring our department purchased a spectrophotometer that is currently stationed in the chemistry lab because it has to be attached to a computer to read the results. Currently it is attached to Tracy Burgess' personal laptop. With a mobile lab the spectrophotometer could be placed on the cart with the computers and used by all classes.

Though we would be able to purchase more desktops, we are requesting the \* money for laptops for the mobility that they provide. Our department members believe it is important for students to experience science outside of the classroom; by doing so they will understand the relevancy of what they are learning. By having equipment that travels with them, they will be able to input and store data wherever they are. We would also be able to create new situations for the students with the use of videos and web casting. This mobile lab would also allow for cross-class projects in which students would share information and build upon each other's findings. Our forensics unit is an example of this style of cooperative learning. Last year we had five separate classes participating in this project, each keeping their own journals. This made information sharing difficult at best. Journals were often misplaced, partially filled or had large gaps in them. With the mobile lab our students would have access not only to the school's network, but would be able to save their work to a common file accessible to other classes.

With changing graduation requirements affecting the state of Idaho, this year's freshmen will be facing new challenges throughout their high school career. Three years of math and science will be required. In 2012, each graduating senior will also have to complete and present a senior project in order to graduate. The use of computers in the science lab and in the field will allow our students to create projects that they can keep in their high school portfolio to demonstrate subject mastery and a variety of research methods used. We are very excited about this project and see limitless use for these computers in our program.



### Current Innovations

Our staff at Salmon High School is excited about the new units and projects we have created over the past few years. We feel they represent the best of both sound scientific principles and field usage, which allows our students to gain knowledge we feel they will need in life. We are lucky to live in a community that is willing to take an active role in our program. Some of the projects we have taken part in during the last year, which utilize both science and technology, are pit tagging bull trout, telescopic observations of the night sky and genetic studies done while artificially inseminating cattle.

This fall our students in the environmental issues class were able to spend a day with conservation officers from the Fish and Game tagging bull trout. During that time the officers also showed our students how they tracked the fish, and kept data on them. With the addition of computers, our students would actually be able to input that data and keep their own counts. Bull trout are currently listed as an endangered species in Idaho. By keeping track of incoming data, students would be able to draw their own conclusions on the recovery program. They would be able to compare average numbers, size and gender of the fish from year to year. This would be an exciting, yet practical way to present a unit on conservation occurring in our area.

Salmon High currently has two telescopes that have been donated to our program, one of them a deep space telescope. Students enrolled in astronomy are required to spend two evenings during the semester "stargazing." We currently use star maps in tandem GPS systems so that students can identify the stars that they are observing. With the addition of laptops, we would have stations facing each cardinal direction and with the program *Stellarium*, participants would be shown the constellations in the sky at that precise moment. They would then be able to locate them in the sky easier. We would also be able to create our own star charts and observe how the night sky changes over the course of a semester.

Last year, our genetics course took a field trip to a local ranch to participate in preg. testing the cattle. The owners of the ranch also took our students through the process of artificially inseminating the cattle. The students were shown how the sperm was kept in liquid nitrogen, the hormonal counts which are done and most importantly the genetic traits that the ranchers bred for. They were given example pedigree lines and then shown what some of the cattle had sold for in the past. Later that spring, the students went back and observed some of the calves that had been born through this selective breeding program. Something that we will incorporate this year is choosing certain traits and doing statistical analysis on them. Students could then determine how these traits are passed, whether they were dominant, recessive, codominant, etc. The computers would be a great aid in this project. They could be taken on site and used for data collection. They would make analysis much quicker using spreadsheets to do both the statistics and the graphs. We felt this was a great experience because it demonstrated to our students what they were learning in the classroom was financially applicable to a local profession.

These are just a few samples of what we are currently doing in our classrooms to bring science into our students' lives. There are many more ideas and projects we have developed that we are excited about and feel will enhance our student's education and post-school opportunities.



### Project Description

The science department at Salmon High School is currently trying to find the funding for a mobile computer lab. This would consist of a small number of computers and a color printer to be used in collaboration with laboratory projects that occur in our program. The team members participating in this project consists of the three science teachers in our department: Renae Lewis, Tracy Burgess, and Arlene Wolf. Our goal is to create an environment that will best prepare students for challenges that they will face after they leave high school. Rather than just teaching our students basic scientific principles with lecture and worksheets, we believe our students need to gain problem solving skills and the ability to think analytically. We have found the best way to do this is with the use of hands-on discovery and active learning.

For the past five years the members of our department have worked toward creating an elite science program that will have our students prepared to “hit the ground running” after graduation. It is our objective to graduate students who can compete with their peers from across the nation. This project began when it became apparent that the equipment we were using, which was purchased in the early eighties, did not have a lot of life left in it. At that point we brain stormed and planned until we had what we thought was a feasible three-tiered plan to build the program we wanted for our students. The first stage of this plan was to purchase equipment that would allow us to refurbish both our physical and natural science labs. We were able to do this with a Qwest Foundation grant awarded to us in the 2005-2006 school year and an Idaho Community Foundation grant (Albertson’s) awarded during the 2006-2007 school year. Using these monies we purchased updated equipment such as a ripple tank, a force table, an optics unit, smart timers with probes and motion sensors. We were also able to add grow lights, a hydroponics system and limnology test kits to our natural science laboratories.

The second part of our strategy involved a realignment of curriculum and the creation of new offerings that we felt reflected modern use of science in society. We believe by offering courses that students felt were relevant we could increase the number of students interested in our program. We created genetics, botany, astronomy and environmental issues courses. These courses covered much of the science that students could read about in the daily paper and best complemented the traditional offerings already available to the students. During the 2007-2008 school year, we were again awarded a Qwest grant which we used to buy more complex equipment used for higher level problem-solving techniques such as a centrifuge, forensic equipment and electrolysis set ups for DNA analysis. With this grant, we were also able to create a cross-curricular forensic unit. The project involved multiple science classes, journalism, and creative writing classes using forensic techniques and reasoning skills to solve a fictional murder that had occurred in the chemistry lab. The unit was designed to be a project that would encapsulate most of what the students had been learning through the year. It lasted for five weeks at the end of last spring and we felt it was a great way to end the school year. To hear normally uninterested students arguing in hall about bullet trajectory and the shooter’s height or whether the fingerprints pulled from a doorknob were arched or swirled is enough to make any science teacher smile. The student’s comments in their journals have already given us great ideas for this springs project.

The growth of our program over the last five years has been a very exciting transformation. We have watched our classes grow dramatically in both numbers and



offerings. We have also taken large steps in showing our students the relevancy of science in the world around them, including our community. We do find, however, that we are still sorely lacking in some areas. The most apparent being our lack of computers to which our students have access. Salmon High School currently has only thirty-six working computers for three hundred and fifty students. These computers are used every hour for month in the fall and spring due to ISAT testing. They are used by IDLA students throughout the rest of the year. This makes them largely unavailable for classroom use unless students group two or three to a computer and even then we are still competing with other departments for computer time. By acquiring a mobile computer lab, we would open the doors to more field research and cross-class studies. The computers could be used indoors and out. Data collection would be more accurate and analysis would be immediate. The computers will be used with equipment that we purchased in the past for studies in the physical sciences such as forces, motion, and chemical analysis. In life sciences they would aid in field studies such as plant transpiration, DNA restriction and plant reaction to soil amendments. One of the best things about a mobile science computer lab is the possibility that it bring for cross-class projects. With the ability to save work and then pass it on to students in another class, students will be able to work cooperatively with partners in other classes on multi-faceted labs. Each group will be able to view another's work and then contribute its own data and research. The possibilities really are limitless.

When we purchase these computers, we will also be able to draw on the district's support for their use and maintenance. Our school has a wireless server that the students will have access to and multiple printers that they can use. Our technology coordinator supports our efforts and will be available to help with the maintenance of the computers and in buying new software for future use. We will have access to all site licenses that the school has purchased and the school's wireless internet. As a department, we will be using a large part of next year's budget to purchase a mobile cart and docking station for the computers. This spring we are also eligible to once again apply for the Idaho Community Foundation grant (\$5,000) and the INEL technology grant (\$2,000). We will use these grants to add to our bank of computers for student use.

With the addition of senior projects becoming a graduation requirement in 2012 we believe that is crucial for our students to understand that there is much more to technology than just the internet. Research and discovery can come in many forms. We hope to be able to introduce our students to a wide variety of skills before they will be participating in a high stakes assessment their senior year. The impact that we anticipate observing is not only the continued growth in class numbers but the ability of our students to demonstrate that they can think analytically and solve problems that may have no first-hand knowledge of. Our department is very excited about the possibilities computers would bring to our program and to our student's education.



## Scope and Sequence

In the past five years, the Salmon Science Department has taken a stale, traditional program and created one that is fresh and exciting with the addition of technology and relevant application. Since implementing the changes to our program we have observed many measurable milestones that we believe accurately gauge how close we are to the goals we have set.

The first and largest change is an increase in the number of students enrolled in our classes. This year our numbers are staggering. Our current student body consists of 350 students and our department offers 15 periods of science throughout the day. Within those periods we are seeing a total of 367 students, 28 of which take more than one science class a day, which is approximately 96% of our student body. These numbers are up dramatically from even three years ago when only about 82% of our students were enrolled in at least one science course. Some of the outcomes that these numbers have had on our program are that we have changed genetics to a full year course from a semester course. We now offer both a fall and a spring semester of astronomy and the purchasing of new botany text books after the class grew from eight students the first year it was offered to over thirty students each of the last two years. We have also seen increases in the numbers of students interested in our traditional offerings such as physics, chemistry and anatomy. Along with the sheer numbers, we have also observed a large decrease in the number of students receiving grades lower than a C (down 8% the spring semester of 2008 from the spring semester of 2007). In order to receive these grades, students must demonstrate mastery performance of skills and high level problem solving skills to come to accurate conclusions based on observations and data collection. Tied to these numbers of successful students, we have seen a marked increase in standardized science test scores such as the ACTs and ISATs.

It is our belief that the addition of computers would increase our student's success rates. We would begin incorporating the computers into lab situations as soon as we had them. The computers would make data collection quicker and more accurate and would use software that we currently have but cannot use due to access limitations on the computers. Even when the latter are available, they cannot be moved into a laboratory setting. The mobile lab will also allow for journal keeping between classes on large-scale projects such as our catapult construction and competition project. One of our goals is to expose this year's freshmen to as many research techniques as possible before their senior year when they will be the first class at Salmon High to have to present a senior project to a panel of judges. Their graduation will depend partly on this project, so it is important to have them prepared for it.

Our team has spent a long period of time scrutinizing our program. We feel we have come up with a consistent assessment system that relies heavily on performance based outcomes. The skills that our students are gaining will help them no matter what they choose to do after high school. The mobile lab that we are trying to fund is something that is sorely missing in our students' education. In our technology based world, knowing how to compile a spreadsheet, graph, or to use existing software to make a problem easier to solve are skills that are needed in the world outside of Salmon High School. Our team members have a wide variety of experience and an overwhelming passion for what they do; with these computers the sky really is the limit on what we could achieve with our students.

### Budget Narrative

The money from this grant would be used to purchase 10 new 2.1 GHz MacBooks with 2 GB of memory, a Cannon PIXMA i100 and a site license for iWork software to be used for data collection and presentation. These materials would go towards building a mobile computer lab to be used by the Salmon High School Science Department.

**QWEST FOUNDATION GRANT  
BUDGET SHEET**

<b>Materials Purchased</b>	<b>Quantity</b>	<b>Unit Price</b>	<b>Total</b>
13" Mac Book 2.1GHz	10	\$949.00	\$9,490.00
Cannon PIXMA i100 portable printer	1	\$249.95	\$249.95
Site license for iWork 08 software	1	\$249.00	\$249.00

SHIPPING: Free

**GRAND TOTAL: \$9,988.95**